

CLAIMS:

1. A network device having a plurality of ports for switching data packets between network ports of said plurality of ports, said network device comprising:

a first switch having a first group of ports which are a subset of said plurality of ports and are numbered by a first numbering scheme, a first rate control logic for performing rate control functions related to switching data packets between said network ports, and a first local communications channel for transmitting messages between said first group of ports and said rate control logic, said first switch being configured to generate rate control messages based on data packet traffic to said first group of ports;

a second switch having a second group of ports which are a subset of said plurality of ports and are numbered by a second numbering scheme different from said first numbering scheme, a second rate control logic for performing rate control functions related to switching data packets between said network ports, and a second local communications channel for transmitting messages between said second group of ports and second rate control logic, said second switch being configured to generate rate control messages based on data packet traffic to said second group of ports;

a CPU coupled to said first switch and said second switch and configured to control said first switch and said second switch; and

wherein a first link port of said first group of ports is coupled to a second link port of said second group of ports, and said first link port and said second link port are configured to relay said rate control messages to each other.

2. The network device of claim 1 further comprising:

address resolution logic (ARL) configured to perform address resolution of data packets received at said network ports of said plurality of ports and to switch data packets from a first network port of said plurality of ports to a second network port of said plurality of ports, to perform address resolution based on said first and second numbering schemes such that when said first network port is in said first group of ports and said second network

port is in said second group of ports, a data packet received at said first network port destined for said second network port is directly routed from said first network port to said second network port.

3. The network device of claim 1, wherein

said first link port is configured to receive a first local rate control message from said first local communications channel within said first switch, to generate a first MAC control frame based on said first local rate control message and to relay said first MAC control frame to said second link port; and

said second link port is configured to receive a second local rate control message from said second local communications channel within said second switch, to generate a second MAC control frame based on said second local rate control message and to relay said second MAC control frame to said first link port.

4. The network device of claim 2, wherein at least one of said first and second link ports comprise:

a tag insertion unit for inserting an inter-stack tag into a packet;

a processing unit for processing said packet; and

a removing unit for removing the inter-stack tag from the packet when the packet is being switched to a destination port;

wherein address resolution is further based on said inter-stack tag.

5. The network device of claim 3, wherein

said second link port is configured to receive said first MAC control frame from said first link port, to extract said first local rate control message from said first MAC control frame, and to relay said first local rate control message to said second local communications channel within said second switch; and

said first link port is configured to receive said second MAC control frame from said second link port, to extract said second local rate control message from said second MAC control frame, and to relay said second local rate control message to said first local communications channel within said first switch.

6. The network device of claim 3, wherein said first said first link is configured to generate MAC control frame using reserved bits of said MAC control frame to define said first local rate control, and said second link port is configured to generate said second MAC control frame using reserved bits of said MAC control frame to define said second local rate control message.

7. The network device of claim 5, wherein said first local communications channel comprises an S channel of said first switch, and said second local communications channel comprises an S channel of said second switch.

8. The network device of claim 6, wherein at least one of said first and second switch is configured to generate rate control messages which comprise side band messages.

9. The network device of claim 6, wherein at least one of said first and second switch is configured to generate a rate control message which comprises a side band message including a source bit identifying a source of said side band message and a port bitmap identifying a congested port of said first group or said second group ports based on said first numbering scheme or said second numbering scheme, respectively.

10. The network device of claim 1, wherein at least one of said first and second switch is configured to generate rate control messages include a

COS queue status notification.

11. The network device of claim 1, wherein at least one of said first and second switch is configured to generate rate control messages include a HOL queue status notification.

12. The network device of claim 8, wherein at least one of said first and second switch is further configured to determine the source of local rate control messages based on said source bit.

13. The network device of claim 11, wherein  
said second link port is configured to send a local rate control message received at said second link port to said second communications channel only when said source is said first switch; and

said first link port is configured to send a local rate control message received at said first link port to said first communications channel only when said source is said second switch.

14. A method for communication of rate control messages between a plurality of switches, said method comprising the steps of:

designating a first plurality of ports of a first switch by a first numbering scheme;

designating a second plurality of ports of a second switch by a second numbering scheme which is different from said first numbering scheme;

coupling a first link port of said first plurality of ports to a second link port of said second plurality of ports;

configuring said first switch to generate a rate control message and to relaying said rate control message to said first link port; and

configuring said first link port to generate a MAC control frame based on said rate control message and relay said MAC control frame to said

second link port.

15. The method of claim 13, wherein said configuring said first link port step includes configuring said first link port step to generate a MAC control frame including data relating to a congested port of said first plurality of ports.

16. The method of claim 13 further comprising the steps of:  
configuring said second link port to extract said rate control message from said MAC control frame and to send said rate control message to a second communications channel within said second switch.

17. The method of claim 14 further comprising the steps of:  
configuring said second link port to extract said rate control message from said MAC control frame and to send said rate control message to a second communications channel within said second switch.

18. The method of claim 13, wherein said configuring said first switch step includes configuring said first switch to generate a rate control message comprising a side band message and relaying said side band message to said first link port via an S channel communications channel.

19. The method of claim 17, wherein said configuring said first switch step includes configuring said first switch to generate a rate control message comprising a side band message including a source bit identifying said first switch as a source of said rate control message and a port bitmap identifying a congested port of said first plurality of ports based on said first numbering scheme.

20. The method of claim 13, wherein said configuring said first

switch step includes configuring said first switch to generate a rate control message comprising a COS queue status notification.

21. The method of claim 13, wherein said configuring said first switch step includes configuring said first switch to generate a rate control message comprising an HOL queue status notification.

22. The method of claim 17 further comprising the steps of:  
configuring said second link port to determine the source of said rate control message based on said source bit.

23. The method of claim 21 further comprising the steps of:  
configuring said second link port to extract said rate control message from said MAC control frame and to send said rate control message to a second communications channel within said second switch when said source is determined to be said first switch.

24. A network device having a plurality of ports for switching data packets between network ports of said plurality of ports, said network device comprising:

a first switch means having a first group of ports which are a subset of said plurality of ports and are numbered by a first numbering scheme, a first rate control logic means for performing rate control functions related to switching data packets between said network ports, and a first local communications channel means for transmitting messages between said first group of ports and said rate control logic, said first switch means being configured to generate rate control messages based on data packet traffic to said first group of ports;

a second switch means having a second group of ports which are a subset of said plurality of ports and are numbered by a second numbering

scheme different from said first numbering scheme, a second rate control logic means for performing rate control functions related to switching data packets between said network ports, and a second local communications channel for transmitting messages between said second group of ports and second rate control logic, said second switch means being configured to generate rate control messages based on data packet traffic to said second group of ports;

a processor means coupled to said first switch and said second switch and for controlling said first switch and said second switch; and

wherein a first link port of said first group of ports is coupled to a second link port of said second group of ports, and said first link port and said second link port are configured to relay said rate control messages to each other.

25. The network device of claim 23 further comprising:

address resolution logic (ARL) means configured to perform address resolution of data packets received at said network ports of said plurality of ports and to switch data packets from a first network port of said plurality of ports to a second network port of said plurality of ports, to perform address resolution based on said first and second numbering schemes such that when said first network port is in said first group of ports and said second network port is in said second group of ports, a data packet received at said first network port destined for said second network port is directly routed from said first network port to said second network port.

26. The network device of claim 23, wherein

said first link port is configured to receive a first local rate control message from said first local communications channel means within said first switch means, to generate a first MAC control frame based on said first local rate control message and to relay said first MAC control frame to said second

link port; and

said second link port is configured to receive a second local rate control message from said second local communications channel means within said second switch means, to generate a second MAC control frame based on said second local rate control message and to relay said second MAC control frame to said first link port.

27. The network device of claim 24, wherein said first and second link ports each comprise:

a tag insertion means for inserting an inter-stack tag into a packet;

a processing means for processing said packet; and

a removing means for removing the inter-stack tag from the packet when the packet is being switched to a destination port;

wherein address resolution is further based on said inter-stack tag.

28. The network device of claim 25, wherein

said second link port is configured to receive said first MAC control frame from said first link port, to extract said first local rate control message from said first MAC control frame, and to relay said first local rate control message to said second local communications channel means within said second switch means; and

said first link port is configured to receive said second MAC control frame from said second link port, to extract said second local rate control message from said second MAC control frame, and to relay said second local rate control message to said first local communications channel means within said first switch means.

29. The network device of claim 27, wherein said first local communications channel means comprises an S channel of said first switch, and said second local communications channel means comprises an S



channel of said second switch.

30. The network device of claim 28, wherein at least one of said first and second switch means is configured to generate rate control messages which comprise side band messages.

31. The network device of claim 28, wherein at least one of said first and second switch means is configured to generate a rate control message which comprises a side band message including a source bit identifying a source of said side band message and a port bitmap identifying a congested port of said first group or said second group ports based on said first numbering scheme or said second numbering scheme, respectively.

32. The network device of claim 23, wherein at least one of said first and second switch means is configured to generate rate control messages include a COS queue status notification.

33. The network device of claim 23, wherein at least one of said first and second switch means is configured to generate rate control messages include a HOL queue status notification.

34. The network device of claim 30, wherein at least one of said first and second switch means is further configured to determine the source of local rate control messages based on said source bit.

35. The network device of claim 33, wherein  
said second link port is configured to send a local rate control message received at said second link port to said second communications channel means only when said source is said first switch means; and  
said first link port is configured to send a local rate control message

received at said first link port to said first communications channel means  
only when said source is said second switch means.